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Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

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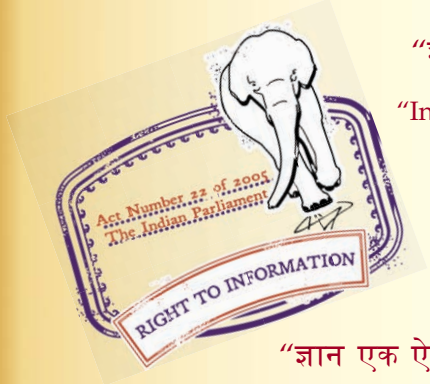
IS 11853-1 (1987): Data Interchange on 130 mm, Double Sided, 3.8 tpmm, Flexible Disk Cartridges Using Modified Frequency Modulation Recording, Part 1: Dimensional, Physical and Magnetic Characteristics [LITD 16: Computer Hardware, Peripherals and Identification Cards]



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"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS : 11853 (Part 1) - 1987
ISO 8378/1 - 1986

Indian Standard

SPECIFICATION FOR DATA INTERCHANGE ON 130 mm, DOUBLE SIDED, 3·8 tpmm, FLEXIBLE DISK CARTRIDGES USING MODIFIED FREQUENCY MODULATION RECORDING

PART 1 DIMENSIONAL, PHYSICAL AND MAGNETIC CHARACTERISTICS

[ISO Title : Information Processing-Data Interchange on 130 mm (5·25 in) Flexible Disk Cartridges Using Modified Frequency Modulation Recording at 7 958 ftprad, 3·8 tpmm (96 tpi), on Both Sides — Part 1 Dimensional, Physical and Magnetic Characteristics]

National Foreword

This Indian Standard (Part 1) which is identical with ISO 8378/1-1986 'Information processing — Data interchange on 130 mm (5·25 in) flexible disk cartridges using modified frequency modulation recording at 7 958 ftprad 3·8 tpmm (96 tpi) on both sides—Part 1 : Dimensional, physical and magnetic characteristics', issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Computers, Business Machines and Calculators Sectional Committee and approval of the Electronics and Telecommunication Division Council.

In the adopted standard certain terminology and conventions are not identical with those used in Indian Standards; attention is specially drawn to the following:

a) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use a point (.) as the decimal marker.

b) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

c) For the purpose of this Indian Standard, metric dimensions are applicable.

Cross References

International Standard	*Corresponding Indian Standard*
ISO 646-1983 Information processing — ISO 7-bit coded character set for information interchange	IS : 10315-1982 7-bit coded character set for information interchange (Technically equivalent)
ISO 4873-1979 Information processing — ISO 8-bit code for information interchange—Structure and rules for implementation	IS : 10401-1982 8-bit coded character set for information interchange (Technically equivalent)
ISO 7665-1983 Information processing — File structure and labelling of flexible disk cartridges for information interchange	IS : 11406-1986 File structure and labelling of flexible disk cartridges for information interchange (Identical)

The Computers, Business Machines and Calculators Sectional Committee has reviewed the provisions of the following ISO standards and has decided that this is acceptable for use in conjunction with this standard:

ISO 2022 Information processing — ISO 7-bit and 8-bit coded character sets — Code extension techniques

ISO 9293 Information processing — Volume and file structure of flexible disk cartridges for information interchange

Adopted 26 August 1987

Gr 8

BUREAU OF INDIAN STANDARDS
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0 Introduction

ISO 8378 specifies the characteristics of 130 mm (5.25 in) flexible disk cartridges recorded at 7 958 ftprad, 3,8 tpmm (96 tpi), using modified frequency modulation (MFM) recording on 80 tracks on each side.

ISO 8378/2 and ISO 8378/3 each specify the quality of recorded signals, the track layout, and a track format to be used on 130 mm (5.25 in) flexible disk cartridges, intended for data interchange between data processing systems.

ISO 8378/1 and ISO 8378/2, together with the labelling scheme specified in ISO 7665, provide for full data interchange between data processing systems.

ISO 8378/1 and ISO 8378/3, together with the labelling scheme specified in ISO 9293, provide for full data interchange between data processing systems.

1 Scope and field of application

This part of ISO 8378 specifies the dimensional, physical and magnetic characteristics of the cartridge so as to provide physical interchangeability between data processing systems.

NOTE — Numeric values in the SI and/or Imperial measurement system in this part of ISO 8378 may have been rounded off and therefore are consistent with, but not exactly equal to, each other. Either system may be used, but the two should be neither intermixed nor re-converted. The original design was made using Imperial units and further developments were made using SI units.

2 Conformance

A flexible disk cartridge shall be in conformance with ISO 8378 when it meets all the requirements of this part of ISO 8378 and all those of either ISO 8378/2 or ISO 8378/3.

3 References

ISO 7665, *Information processing — File structure and labelling of flexible disk cartridges for information interchange.*

ISO 8378, *Information processing — Data interchange on* 130 mm (5.25 in) *flexible disk cartridges using modified frequency modulation recording at* 7 958 ftprad, 3,8 tpmm (96 tpi), *on both sides —*

Part 2 : Track format A.

Part 3 : Track format B.

ISO 9293, *Information processing — Volume and file structure of flexible disk cartridges for information interchange.*

4 Definitions

For the purpose of this part of ISO 8378 the following definitions apply.

4.1 flexible disk : A flexible disk which accepts and retains on the specified side or sides magnetic signals intended for input/output and storage purposes of information data processing and associated systems.

4.2 reference flexible disk cartridge : A flexible disk cartridge arbitrarily selected for a given property for calibrating purposes.

4.3 secondary reference flexible disk cartridge : A flexible disk cartridge intended for routine calibrating purposes, the performance of which is known and stated in relation to that of the reference flexible disk cartridge.

4.4 signal amplitude reference flexible disk cartridge : A reference flexible disk cartridge selected as a standard for recording field and signal amplitude.

NOTE — A master standard for signal amplitudes, reference fields, overwrite and resolution characteristics has been established by the Physikalisch-Technische Bundesanstalt (PTB) Bundesallee 100 in Braunschweig, Germany, F.R. Secondary reference flexible disk cartridges can be ordered from PTB Lab 1.41 under part number RM 7487 as long as available.

4.5 typical field (for each side) : The minimum recording field, which, when applied to a flexible disk cartridge, causes a signal output equal to 95 % of the maximum average signal

amplitude when taken as a function of the recording field at the specified track and flux transition frequency of that flexible disk cartridge.

4.6 reference field : The typical field of the signal amplitude reference flexible disk cartridge.

4.7 test recording current (for each side) : The current between 145 % and 155 % of the current which produces the reference field at 125 000 flux transitions per second (ftps) on track 00 on both sides.

4.8 standard reference amplitude (SRA) (for each side) : The average signal amplitudes derived from the reference tracks on the signal amplitude reference flexible disk cartridge using the appropriate test recording current.

SRA_{1f} is the average signal amplitude from a recording written using 125 000 ftps.

SRA_{2f} is the average signal amplitude from a recording written using 250 000 ftps.

4.9 average signal amplitude : The arithmetically averaged value for a track of the output voltages measured peak-to-peak over the whole track.

4.10 in-contact : An operating condition in which the magnetic surface of the disk intended for data storage is in physical contact with the magnetic heads.

4.11 formatting : Writing the proper control information, establishing the physical tracks, and designating the addresses of physical records on the flexible disk's surfaces.

4.12 initialization : Writing the volume label, the ERMAP label and other information initially required to be on the flexible disk cartridge prior to the commencement of general processing or use.

4.13 recording area : That area of each disk surface with which the head may come into contact.

5 General description

5.1 General figures

A typical flexible disk cartridge is represented in figures 1 to 3 as follows :

Figure 1 — Flexible disk cartridge, shows the cartridge seen from above, side 0 up.

Figure 2 — Section A-A, is a cross-section along line A-A in figure 1.

Figure 3 — Protective envelope with cartridge, shows a protective envelope with cartridge, side 1 up.

5.2 Main elements

The main elements of this flexible disk cartridge are

- the recording disk;
- the liner;
- the jacket.

The cartridge is stored in an envelope.

5.3 Description

The jacket is of a square form. It includes a central window, an index window and a head window in both sides.

The liner is fixed to the inside of the jacket. It comprises two layers of material between which the disk is held. The liner has the same openings as the jacket.

The disk has only a central and an index window.

5.4 Optional features

The interchange characteristics of the jacket allow for variations of its construction as follows :

a) the jacket may include flaps (for example three flaps as shown in the diagram, or more);

b) the jacket may include notches along the reference edge;

c) the centre of the disk may be reinforced by hub support rings (see annex D).

6 General requirements

6.1 Environment and transportation

6.1.1 Testing environment

Tests and measurements made on the cartridge to check the requirements of ISO 8378 shall be carried out under the following conditions :

- temperature : 23 ± 2 °C (73 ± 4 °F);
- relative humidity : 40 to 60 %;
- conditioning before testing : 24 h minimum.

The temperature and the relative humidity shall be measured in the air immediately surrounding the cartridge.

The stray magnetic field at any point on the disk surface, including that resulting from the concentrating effect of the recording head, shall not exceed 4 000 A/m (50 Oe).

6.1.2 Operating environment

Cartridges used for data interchange shall be operated under the following conditions :

- temperature : 10 to 51,5 °C (50 to 125 °F);

— relative humidity : 20 to 80 %;

— wet-bulb temperature : less than 29 °C (84 °F).

The temperature and the relative humidity shall be measured in the air immediately surrounding the cartridge. It is recommended that the rate of change of the temperature should not exceed 20 °C (36 °F) per hour.

For reliable interchange, it is recommended that the temperature and relative humidity conditions when reading are not at the opposite extremes to the conditions when writing.

There shall be no deposit of moisture on or in the cartridge.

The stray magnetic field at any point on the disk surface, including that resulting from the concentrating effect of the recording head, shall not exceed 4 000 A/m (50 Oe).

6.1.3 Storage environment

During storage the cartridges shall be kept under the following conditions :

— temperature : 4 to 51,5 °C (40 to 125 °F);

— relative humidity : 8 to 80 %.

Each cartridge shall be in an envelope and in an upright position.

There shall be no deposit of moisture on or in the cartridge.

The ambient stray magnetic field at any point on the disk surface shall not exceed 4 000 A/m (50 Oe).

NOTE — Cartridges which have been stored at temperatures and humidities outside the operating conditions may exhibit degraded performance characteristics. Such cartridges should be subjected to a conditioning period of not less than 24 h within the operating environment prior to use.

6.1.4 Transportation

Responsibility for ensuring that adequate precautions are taken during transportation shall be with the sender. During transportation the cartridge shall be in its envelope and in a protective package. The latter shall be free from dust or extraneous matter. It shall have a clean interior and a construction to minimize ingress of dust and moisture. It is recommended that a sufficient space exists between cartridge and outer surface of the final container so that risk of damage due to stray magnetic fields will be negligible.

It is recommended that the following conditions are not exceeded :

— temperature : −40 to 51,5 °C (−40 to 125 °F);

— maximum rate of temperature change : 20 °C (36 °F) per hour;

— relative humidity : 8 to 90 %.

There should be no deposit of moisture on or in the cartridge.

6.1.5 Handling

The cartridge shall stay out of its envelope for the shortest time possible. When handling the cartridge the operator shall not touch the exposed magnetic surfaces of the disk and shall avoid exposing the cartridge to direct sunlight, moisture and dust.

6.2 Materials

6.2.1 Jacket

The jacket may be constructed from any suitable material.

6.2.2 Liner

The material of the liner shall be able to retain dust without damage to the disk.

6.2.3 Disk

The disk may be constructed from any suitable material (for example bi-axially oriented polyethylene terephthalate) coated on both sides with a strong and flexible layer of magnetic material (for example γ-Fe_2O_3).

6.2.4 Envelope

The envelope may be manufactured from any suitable material (for example paper).

6.3 Direction of rotation

The direction of rotation shall be counterclockwise when looking at side 0.

7 Dimensional characteristics

The dimensional characteristics listed in the following clauses are indicated in figures 4 to 7.

Figure 4 — Jacket dimensions, shows the jacket.

Figure 5 — Cartridge thickness, shows a partial cross-section of the jacket.

Figure 6 — Disk dimensions, shows the disk.

Figure 7 — Disk thickness, shows a cross-section of the disk.

All dimensions are referred to the reference edge of the cartridge (see figure 4).

7.1 Jacket

7.1.1 Form

The jacket shall have a square form with angles of 90° ± 30′ and a side length

l_1 = 133,3 ± 0,4 mm (5.250 ± 0.015 in)

7.1.2 Thickness

7.1.2.1 Jacket wall and liner

In an area defined by

r_1 = 35 mm (1.38 in)

r_2 = 50 mm (1.97 in)

and with a probe having a diameter of 15 mm (0.59 in) applied against the cartridge with a force of 1 N (3.6 ozf), the thickness of the jacket wall and liner shall be

e_1 = 0,45 ± 0,15 mm (0.018 ± 0.006 in)

7.1.2.2 Cartridge

The overall thickness of the cartridge shall be (see 7.1.7)

1,2 mm (0.047 in) < e_2 < 2,1 mm (0.083 in), when measured according to clauses A.1 and A.2 of annex A.

The cartridge shall fall freely through a gauge with a 2,6 mm (0.10 in) wide opening having flat, vertical walls and depth of 150 mm (5.90 in).

7.1.3 Central windows

The central windows shall have a diameter

d_1 = 39,7 ± 0,2 mm (1.563 ± 0.008 in)

The position of their centre is defined by

l_2 = 66,65 ± 0,30 mm (2.624 ± 0.012 in).

7.1.4 Index windows

7.1.4.1 Location

The centre of the index windows shall be defined by

l_3 = 42,10 ± 0,25 mm (1.657 ± 0.010 in)

l_4 = 60,00 ± 0,25 mm (2.362 ± 0.010 in)

7.1.4.2 Diameter

The diameter of the index windows shall be

d_2 = 6,35 ± 0,20 mm (0.250 ± 0.008 in)

7.1.5 Head windows

7.1.5.1 Location

The location of the lowest point of the head windows shall be defined by

l_5 = 3,30 ± 0,25 mm (0.130 ± 0.010 in)

7.1.5.2 Dimensions

The width of the head windows shall be

l_6 = 12,7 ± 0,2 mm (0.500 ± 0.008 in)

The nominal radius of their ends shall be

r_3 = 6,35 mm (0.250 in)

Their length shall be

l_7 = 35,00 ± 0,25 mm (1.378 ± 0.010 in)

7.1.6 Reference edge profile

Within an area defined by

l_8 = 25 mm (1.0 in)

the reference edge shall have a convex profile, for example be rounded off with one or more radii of 0,3 mm min. (0.012 in min.).

7.1.7 Construction of the jacket

If the jacket utilises flaps, their width shall not exceed

l_9 = 12 mm (0.47 in)

The total thickness e_2 of the cartridge with flaps shall satisfy the conditions of 7.1.2.2 (see annex A).

7.1.8 Notches

Two notches may be provided along the reference edge. If provided, they shall be entirely contained within areas defined by

l_{10} = 48 mm min. (1.889 in min.)

l_{11} = 58 mm max. (2.283 in max.)

l_{12} = 75 mm min. (2.953 in min.)

l_{13} = 85,5 mm max. (3.366 in max.)

l_{14} = 2,0 mm max. (0.078 in max.)

7.1.9 Write-enable notch

The position and size of the write-enable notch shall be defined by

l_{19} = 96,5 ± 0,2 mm (3.799 ± 0.008 in)

l_{20} = 6,35 ± 0,13 mm (0.250 ± 0.005 in)

l_{21} = 3,8 ± 0,2 mm (0.150 ± 0.008 in)

Writing is inhibited by covering the notch with a material of sufficient stiffness and/or opacity.

7.2 Liner

The liner shall always cover the recording area (7.3.4). However, no part of the liner shall protrude by more than 0,5 mm (0.019 in) into the openings of the jacket.

7.3 Disk

7.3.1 Diameter

The external diameter of the disk shall be

d_3 = 130,2 ± 0,2 mm (5.125 ± 0.008 in)

The inner diameter of the disk shall be

d_4 = 28,575 ± 0,025 mm (1.125 ± 0.001 in)

7.3.2 Thickness

The thickness of the disk shall be

e_3 = 0,080 ± 0,010 mm (0.003 0 ± 0.000 4 in)

not including hub supports rings, if fitted.

7.3.3 Index window

7.3.3.1 Location

The location of the index window shall be defined by

r_4 = 25,4 ± 0,1 mm (1.000 ± 0.004 in)

7.3.3.2 Diameter

The diameter of the index window shall be

d_5 = 2,54 ± 0,10 mm (0.100 ± 0.004 in)

7.3.4 Recording area

The recording area shall be defined, on both sides, by

r_5 = 31,3 mm max. (1.23 in max.)

r_6 = 62,5 mm min. (2.46 in min.)

7.3.5 Sides

For convenience of description, the two sides are defined as side 0 and side 1; they are shown in figures 1 to 4 and figure 8.

8 Physical characteristics

8.1 Flammability

The cartridge shall be made from materials that, if ignited from a match flame, do not continue to burn in a still carbon dioxide atmosphere.

8.2 Coefficient of linear thermal expansion of the disk

The coefficient of thermal expansion of the disk shall be

(17 ± 8) × 10^{-6} K^{-1}

8.3 Coefficient of linear hygroscopic expansion of the disk

The coefficient of hygroscopic expansion of the disk shall be

(0 to 15) × 10^{-6} per percent of relative humidity

8.4 Opacity

8.4.1 Opacity of the jacket

The jacket shall have a light transmittance of less than 1 % using an LED with a nominal wavelength of 940 ± 10 nm as the radiation source when measured according to annex B.

8.4.2 Opacity of the disk

The disk shall have a light transmittance of less than 1 % using an LED with a nominal wavelength of 940 ± 10 nm as the radiation source when measured according to annex B.

8.5 Torque

8.5.1 Starting torque

The starting torque, without heads and pad(s) loaded to the cartridge, shall not exceed 0,01 N·m (1.42 ozf·in).

8.5.2 Running torque

When the disk cartridge is tested at a rotational speed of 300 ± 6 r/min, with a pressure pad of 280 ± 10 mm^2 (0.434 ± 0.015 in^2) surface applied with a force of 0,70 ± 0,05 N (2.52 ± 0.18 ozf) and located parallel to the head windows as defined in figure 8 by

l_{15} = 44 mm (1.72 in)

l_{16} = 55 mm (2.16 in)

l_{17} = 7 mm (0.28 in)

l_{18} = 35 mm (1.38 in)

the torque necessary to rotate the disk shall not exceed 0,03 N·m (4.26 ozf·in).

9 Magnetic characteristics[1)]

9.1 Track geometry

9.1.1 Number of tracks

There shall be 80 discrete concentric tracks on each side of the disk in the recording area (7.3.4) for data interchange.

1) The peak of each voltage pulse generated at the read head defines the position of each magnetic flux transition. If two adjacent flux transitions are relatively far apart, then the two voltage signals (one positive and one negative) will not overlap. As the distance between flux transitions decreases, the two voltage signals begin to overlap and to substract from each other, causing a reduction in signal amplitude and a shift in the positions of the voltage signal peaks. This latter phenomenon is referred to as "peak shift". A test method for measuring that portion of the peak shift that is attributable to the flexible cartridge is not presently available but continues to be investigated.

9.1.2 Width of tracks

The recorded track width on the disk surface shall be

0,159 0 ± 0,006 3 mm (0.006 25 ± 0.000 25 in)

The area between the tracks shall be erased. The method of measuring effective track width is given in annex C.

9.1.3 Track location

9.1.3.1 Nominal locations

The nominal radius of the centrelines of all tracks shall be calculated by using the formula

$$R_n = X - \frac{n}{96} \times 25{,}4 \text{ mm}$$

$$(R_n = X - \frac{n}{96} \text{ in})$$

where

n is the track number : n = 00 to 79;

X = 57,150 mm for side 0 (2.250 0 in);

X = 55,033 mm for side one (2.166 7 in).

Therefore, each track on side 1 is offset inwards by eight track positions from the track on side 0 having the same track number.

9.1.3.2 Track location tolerance

For testing purposes, the centrelines of the recorded tracks shall be within ± 0,025 mm (± 0.001 in) of the nominal positions, when measured in the testing environment (see 6.1.1).

9.1.4 Track number

The track number shall be a two-digit decimal number (00 to 79 for each side) which identifies the tracks consecutively, starting at the outermost track (00).

9.1.5 Index

The index signal shall only be used for timing purposes. The index is the point which determines the beginning and the end of the track. At the instant of having detected the leading edge of the index hole, the index is under the read-write gap.

9.2 Functional testing

For the purpose of the following tests the same drive unit shall be used for writing and reading operations.

The in-contact operating condition shall be used.

9.2.1 Surface tests

The magnetic properties of both data surfaces are defined by the testing requirements given below.

9.2.1.1 Test conditions

The disk shall be tested at 300 ± 6 r/min. The test frequencies [flux transitions per second (ftps)] used shall be

$1f$ = 125 000 ± 125 ftps

$2f$ = 250 000 ± 250 ftps

The frequency(ies) to be used shall be specified for each test.

These measurements are performed on tracks 78 because their positions correspond to the certified areas of RM 7487 (see the note to 4.4).

9.2.1.2 Typical field

The typical field of the disk under test shall be within ± 20 % of the reference field. It shall be measured using $1f$ on track 00 on each side.

9.2.1.3 Average signal amplitude

When the disk under test has been recorded with the test recording current, then read back and compared with the signal amplitude reference flexible disk cartridge recorded under the same conditions, and on the same system, the average signal amplitude shall be

side 0, track 00, using $1f$: less than 130 % of SRA_{1f} for side 0;

side 0, track 78, using $2f$: more than 80 % of SRA_{2f} for side 0;

side 1, track 00, using $1f$: less than 130 % of SRA_{1f} for side 1;

side 1, track 78, using $2f$: more than 80 % of SRA_{2f} for side 1.

9.2.1.4 Resolution

For each side record on track 78, using the test recording current for that side, the ratio

$$\frac{\text{Average signal amplitude using } 2f}{\text{Average signal amplitude using } 1f}$$

shall be greater than 90 % of the value of the same ratio for the equivalent side of the signal amplitude reference flexible disk cartridge.

9.2.1.5 Overwrite

On track 00 of each side, after recording with the appropriate test recording current, first using 1*f* and then overwriting with 2*f* for one revolution, the ratio

$$\frac{\text{Residual average signal amplitude at } 1f \text{ after overwrite using } 2f}{\text{Average signal amplitude after first recording using } 1f}$$

shall be less than 100 % of the value of the same ratio for the signal amplitude reference flexible disk cartridge. This test shall be performed on both sides with a frequency-selective voltmeter.

9.2.1.6 Modulation

Modulation shall be

$$\frac{\text{Maximum mean} - \text{Minimum mean}}{\text{Maximum mean} + \text{Minimum mean}} \times 100\ \%$$

The maximum mean shall be the average value of the amplitude modulated output voltage in that part of the track with the maximum amplitudes, and the minimum mean shall be that in the respective part with the minimum amplitudes. Output voltage shall be measured peak-to-peak; averaging shall be done over about 2 000 consecutive flux transitions.

On both sides, on track 00 using 1*f* and on track 78 using 2*f*, modulation shall be less than 10 %.

9.2.2 Track quality tests

These tests apply to all usable tracks at the defined positions on each side. The test recording current shall be used.

9.2.2.1 Missing pulse

Write a track at 2*f* with the appropriate test recording current. Any playback signal, when measured base-to-peak, which is less than 40 % of half the arithmetically averaged value of the output voltages measured peak-to-peak over the preceding 2 000 consecutive flux transitions, shall be a missing pulse.

9.2.2.2 Extra pulse

Write a track at 2*f* with the appropriate test recording current. Erase for one revolution with a constant direct current equivalent to the quiescent value of this test recording current.

Any playback signal which, when measured base-to-peak, including the statistical noise and the residual signal of the disk, exceeds 20 % of half the average signal amplitude at 2*f* of the track under test, shall be an extra pulse.

9.2.3 Rejection criteria

9.2.3.1 Defective track

A track on which one or more missing and/or extra pulses are detected in the same position(s) on consecutive passes shall be a defective track. The applicable number of consecutive passes shall be a matter for agreement between the interested parties.

9.2.3.2 Requirements for tracks

As initially received from the medium supplier, the cartridge shall have no defective tracks.

9.2.3.3 Rejected cartridge

A cartridge which does not meet the requirements of 9.2.3.2 shall be rejected.

10 Bibliography

ISO 646, *Information processing — ISO 7-bit coded character set for information processing interchange.*

ISO 2022, *Information processing — ISO 7-bit and 8-bit coded character set — Code extension techniques.*

ISO 4873, *Information processing — ISO 8-bit code for information interchange — Structure and rules for implementation.*

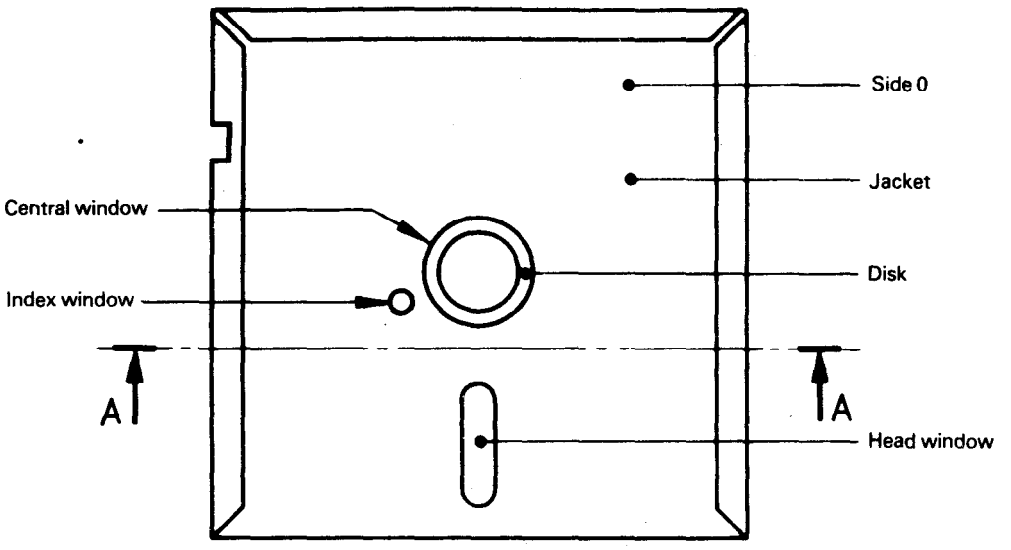

Figure 1 — Flexible disk cartridge

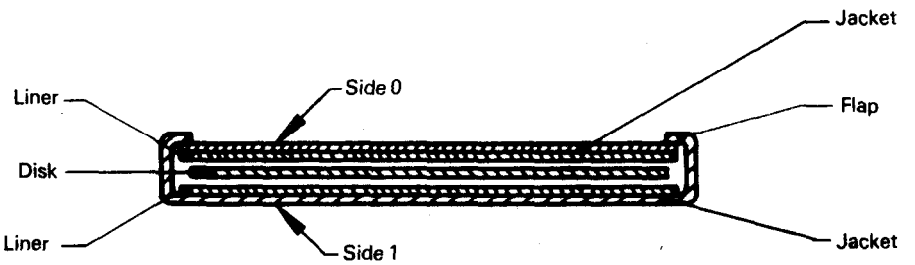

Figure 2 — Section A-A

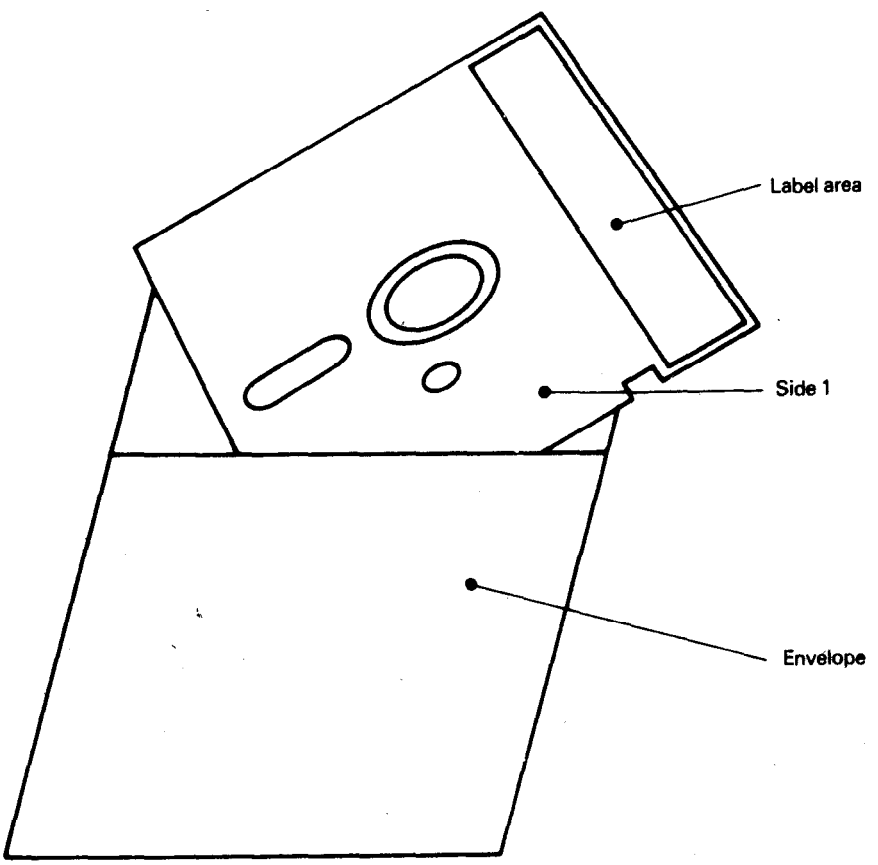

Figure 3 — Protective envelope with cartridge

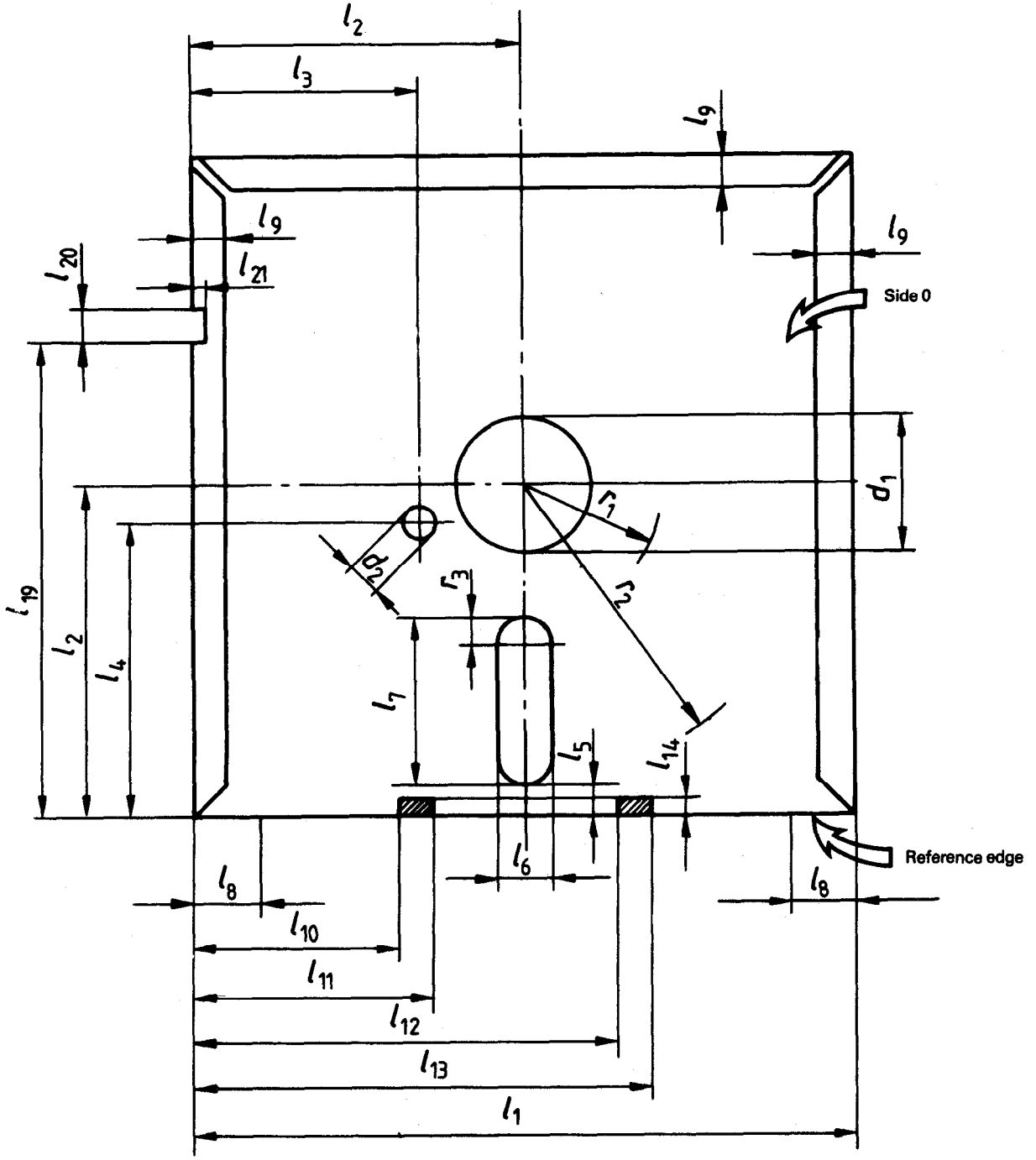

Figure 4 — Jacket dimensions

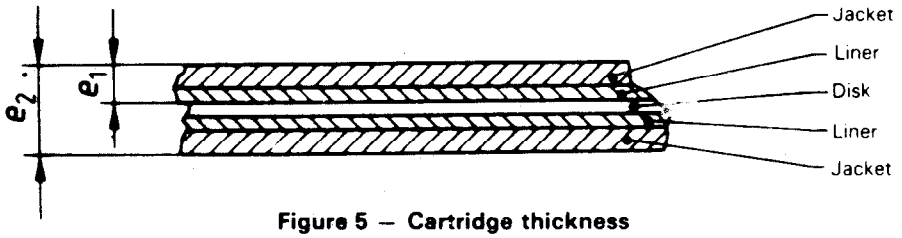

Figure 5 — Cartridge thickness

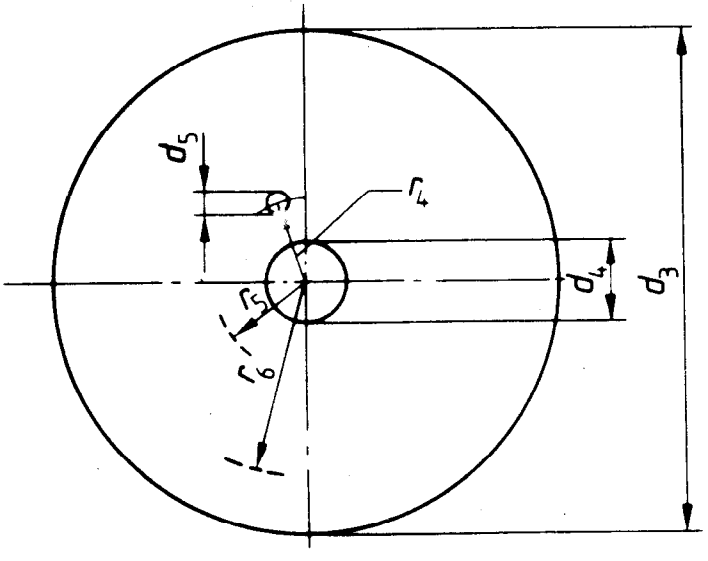

Figure 6 — Disk dimensions

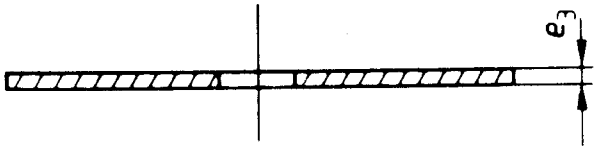

Figure 7 — Disk thickness

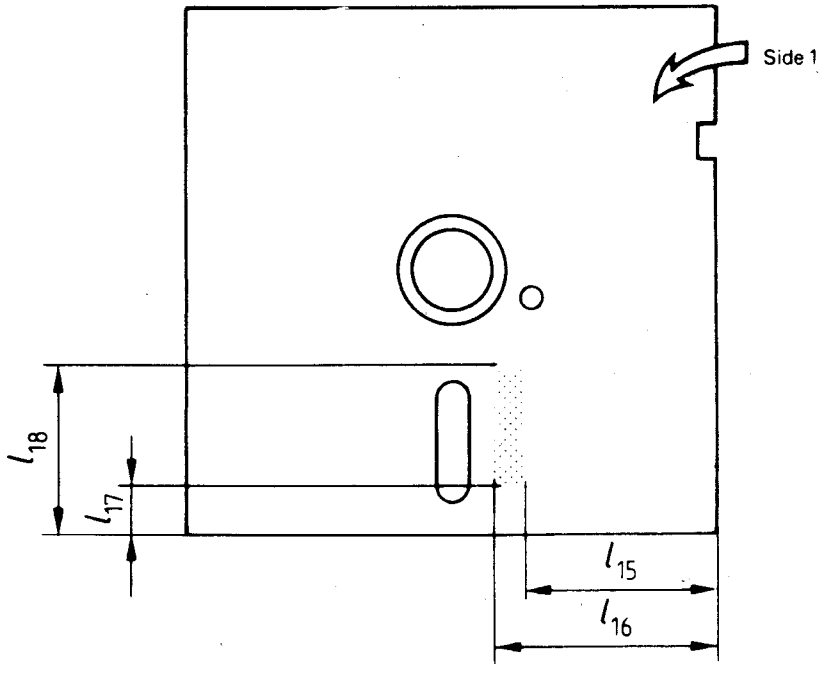

Figure 8 — Pressure pad area

Annex A
Measurement of the cartridge thickness

(This annex forms part of the standard.)

A.1 Maximum thickness

This value shall be measured for all edges using the gauge of figure 9. The cartridge shall be capable of entering the gauge for at least 15 mm (0.59 in) when a force of 1 N max. (3.6 ozf max.) is applied on the opposite edge.

A.2 Minimum thickness

This value shall be measured for all edges using the gauge of figure 10. This gauge has a length of 40 mm (1.57 in). When submitted to a force of 1 N (3.6 ozf) the cartridge shall enter the slot by less than 1 mm (0.039 in).

A.3 Thickness of the flaps (if any)

This thickness shall be measured with the stylus of figure 11. The cartridge is placed on a horizontal surface with flaps opposite to the bottom surface.

The stylus is put on the flap, its axis being perpendicular to the cartridge edge. The stylus is loaded with a force of 1 N (3.6 ozf). The total thickness is measured with a dial gauge. The stylus is then moved radially to the nearest internal zone of the cartridge and the thickness is measured again. The difference between the two values measured is the contribution of the flap to the total thickness of the cartridge.

Dimensions in millimetres
(Dimensions in inches in parentheses)

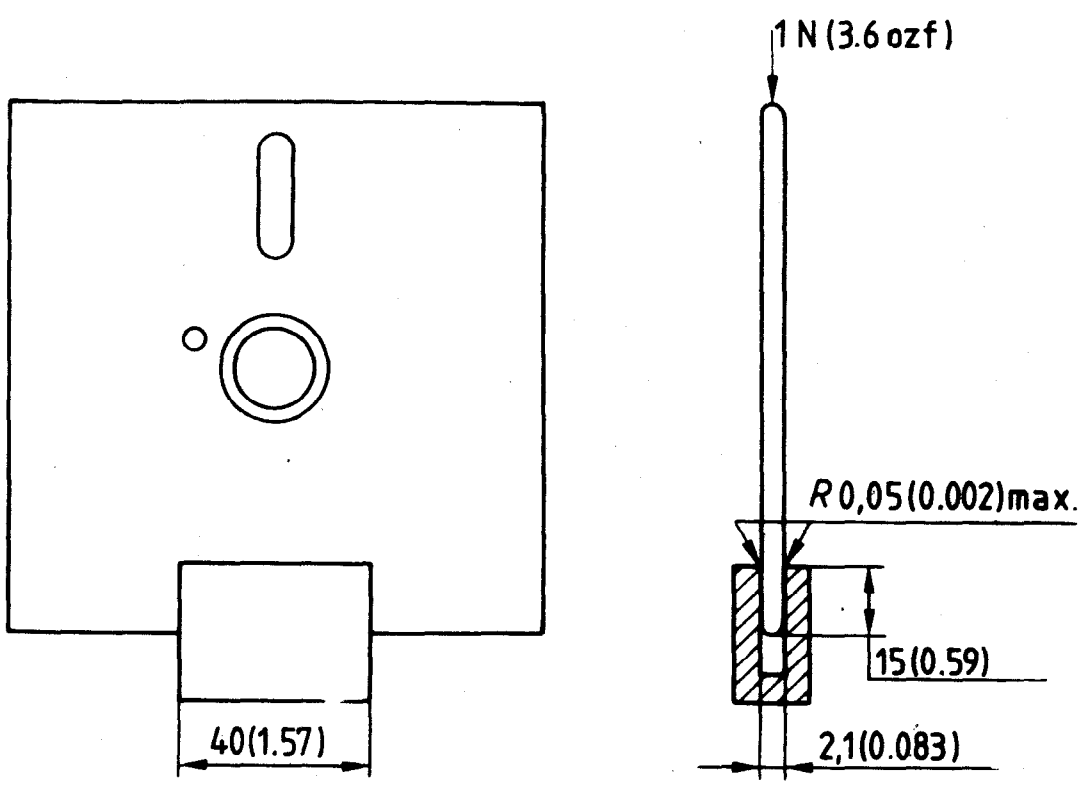

Figure 9 — Measuring gauge

Dimensions in millimetres
(Dimensions in inches in parentheses)

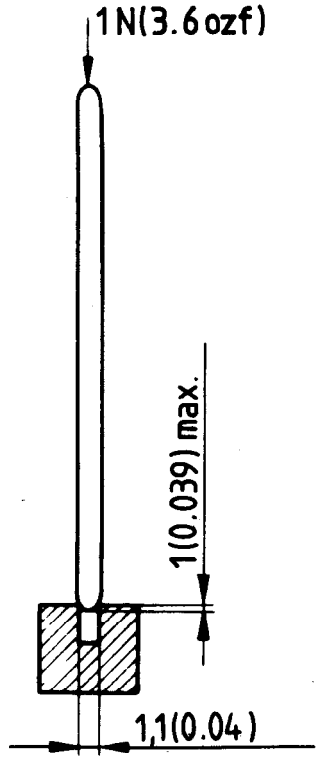

Figure 10 — Measuring gauge

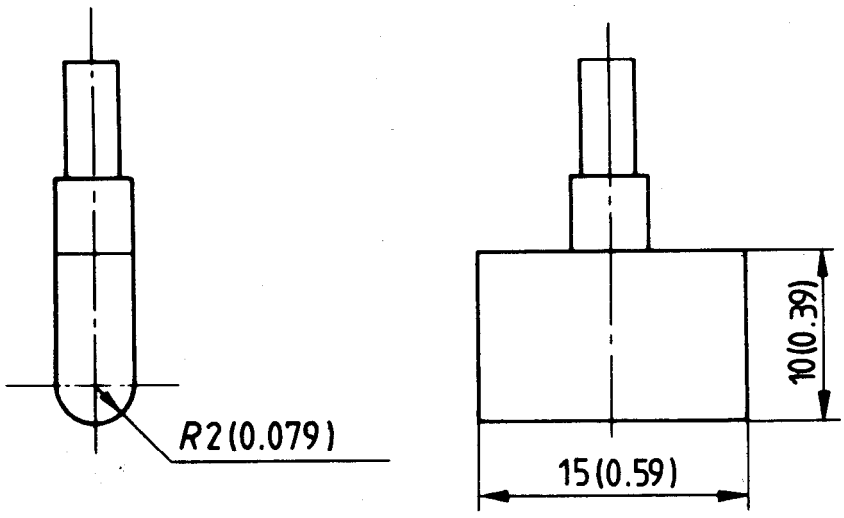

Figure 11 — Stylus

Annex B
Measurement of light transmittance

(This annex forms part of the standard.)

B.0 Introduction

The following description outlines the general principle of the measuring equipment and the measuring method to be applied when measuring the radiation (light) transmittance of the jacket and of the magnetic disk.

For the purpose of this International Standard, "light transmittance" is defined by convention as the relationship between the reading obtained from the test device with the sample inserted and the reading obtained when no sample is present. The transmittance value is expressed as the percentage ratio of the two readings.

The essential elements of the measuring equipment are

- the radiation source;
- the photo diode;
- the optical path;
- the measuring circuitry.

B.1 Description of the measuring equipment

B.1.1 Radiation source

An infra red light-emitting diode (LED) with the following parameters shall be used :

Wavelength at peak emission λ_{peak} = 940 ± 10 nm

Half-power band width b = ± 25 nm

NOTE — Earlier International Standards for unrecorded flexible disk cartridges required the use of an LED with a nominal wavelength of 900 nm, which is no longer available.

B.1.2 Radiation receiver

A flat silicon photo diode shall be used as the radiation receiver. It shall be operated in the shortcircuit mode. The active area of the diode shall be equal to, or at the most 20 % larger than, the open area of the aperture. This condition guarantees a linear dependency of the short circuit diode current on the light intensity.

B.1.3 Optical path (see figure 12)

The optical axis of the set up shall be perpendicular to the disk.

The distance from the emitting surface of the LED to the disk shall be

$$L_1 = \frac{d_{max}}{2 \tan \alpha}$$

where

d_{max} is the maximum diameter of the index window;

α is the angle where the relative intensity of the LED is equal to, or greater than, 95 % of the maximum intensity of the optical axis.

The aperture shall have a thickness of between 1,2 to 1,4 mm (0.047 to 0.055 in) and a diameter given by

$$D = (2 L_2 \tan \alpha) \text{ mm}$$

$$L_2 = (L_1 \pm 1{,}5) \text{ mm}$$

Its surfaces shall be matt black. The whole device should be enclosed within a light-tight casing.

B.1.4 Measuring circuitry

Figure 13 shows the recommended circuitry with the following components :

E : regulated power supply with variable output voltage

R : current-limiting resistor

LED : light-emitting diode

D : Si photo diode

A : operational amplifier

R_{f0}, R_{f1} : feedback resistors

S : gain switch

V : voltmeter

The forward current of the LED and consequently its radiation power can be varied by means of the power supply E. D_i is working in the short circuit mode. The output voltage of the operational amplifier is given by

$$V_0 = I_k \times R_f$$

and is therefore a linear function of the light intensity. I_k is the short circuit current of D_i

R_{f0} and R_{f1} shall be low-temperature drift resistors with an accuracy of 1 %. The following ratio applies

$$\frac{R_{f0}}{R_{f1}} = \frac{1}{50}$$

B.2 Measuring method

B.2.1 Measurement of the disk

The measurements shall be taken within an annular band whose boundaries are tangential to the index window.

— S is set to position 0. With the index window in front of the photo diode, the voltmeter is set to full-scale reading (100 % transmittance) by varying the output voltage of E.

— The disk is rotated until the photo diode is covered by the disk. S is set to position 1. Full deflection of the voltmeter now represents 2 % transmittance.

The disk is rotated slowly for one revolution and the readings of the voltmeter are observed.

B.2.2 Measurement of the jacket

The same procedure applies to the jacket measurement, except that the jacket without a disk shall be rotated.

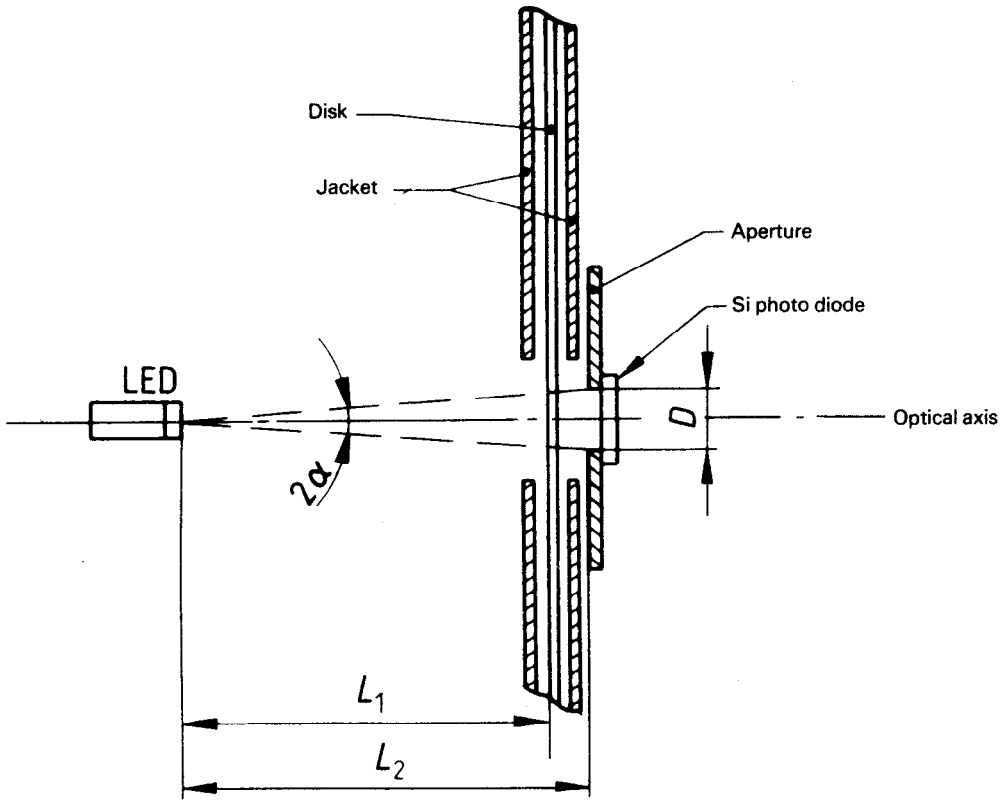

Figure 12 — Measuring device

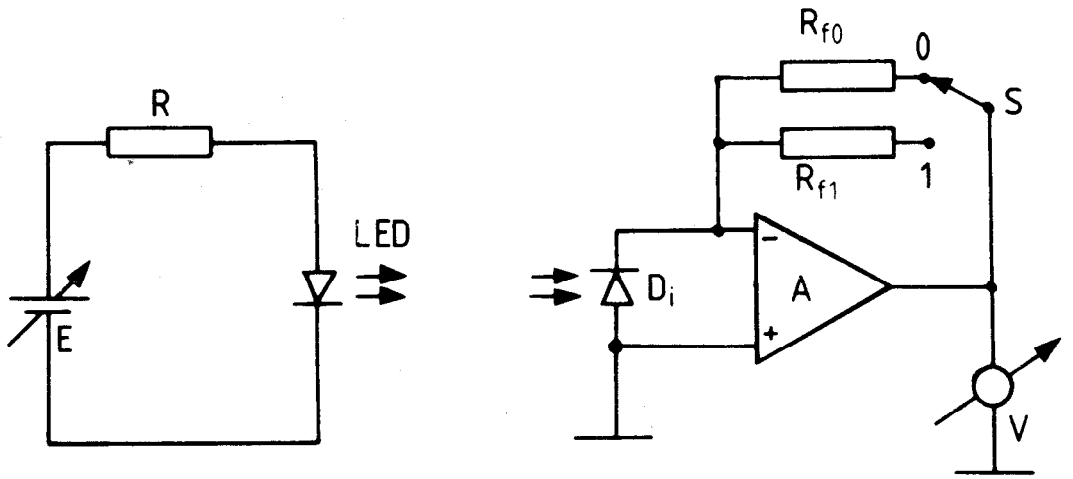

Figure 13 — Electronic circuitry

Annex C

Method for measuring the effective track width

(This annex forms part of the standard)

DC erase a 7-track wide band. Record 250 000 ftps frequency pattern in a track centred in the middle of the erased band, with the erase element active. Measure the output voltage.

Move the head radially over the disk in increments not greater than 0,01 mm (0.000 4 in) to the left and to the right until the read back signal has decreased by 75 %. Determine the read back signal amplitude for each incremental move and plot its amplitude versus displacement. See figure 14 for reading the half track width A and B for both sides of displacement provided the gap width of the head used is not smaller than the effective track width. The total effective track width is the sum of A and B.

Repeat the test to ensure that no thermal or hygroscopic effects have taken place during the measurement.

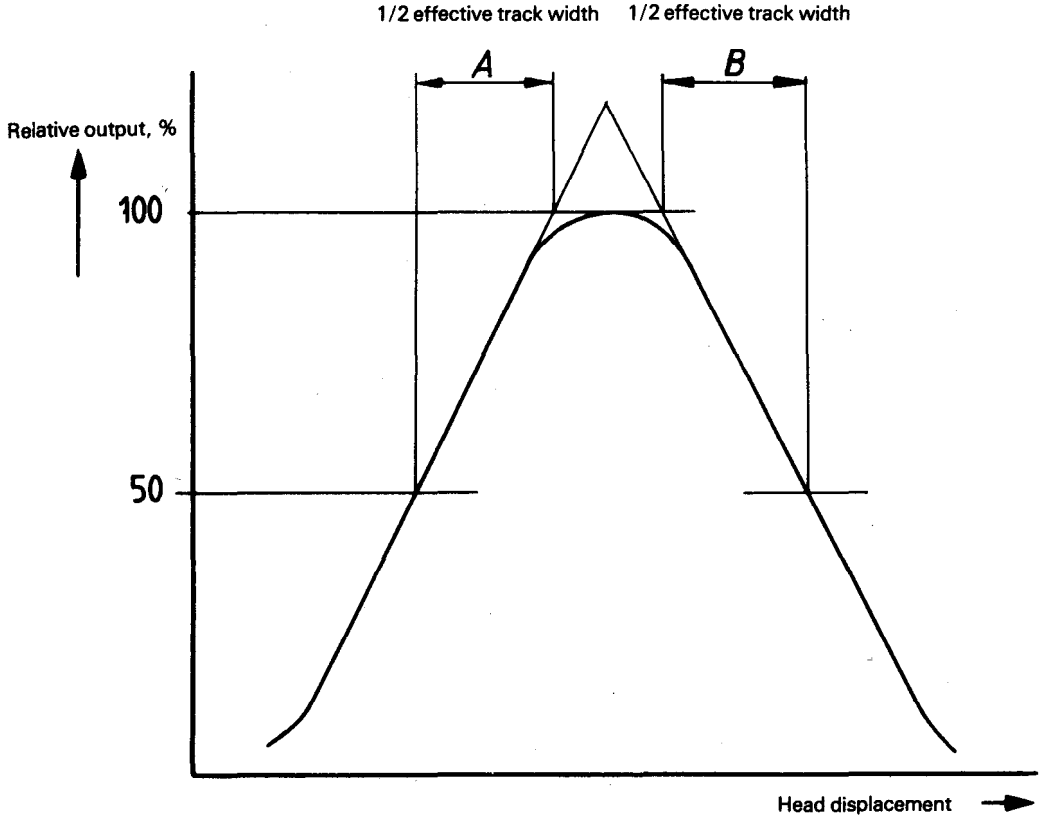

Figure 14 — Track width

Annex D

Use of hub support rings

(This annex does not form part of the standard.)

It is recognized that hub support rings are in common usage. Their use may improve or impair data interchange, according to the conditions of use.

Whether or not a hub support ring is fitted is a matter for agreement between the purchaser and the supplier. It is recommended that the hub support rings, if supplied, are fitted only by the original manufacturer of the flexible disk cartridge.

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